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10/592,913	11/13/2006	Wendelin Jan Stark	0796-76794/DSD	5717

7590
Donald S Dowden
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1185 Avenue of the Americas
New York, NY 10036

12/21/2009

EXAMINER

AHVAZI, BIJAN

ART UNIT	PAPER NUMBER
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1796

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12/21/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/592,913	Applicant(s) STARK ET AL.	
	Examiner BIJAN AHVAZI	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 November 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-232 is/are pending in the application.
- 4a) Of the above claim(s) 25-32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/10/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

1. This action is responsive to the amendment filed on November 23, 2009.
2. Claims 1-3, 5-24 are pending. Claims 1, 2, 5-6, 16 and 24 are amended. Claim 4 is canceled. Claims 25-32 are previously withdrawn from further consideration.
3. The rejection of claims 1-8, 16, 21 and 23 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention is withdrawn in view of the applicants' amendment.
4. Claims 1-3, 5-24 stand provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. (US 10/557,339), in view of Fujii *et al.* (Pat. No. US 4,659,617).
5. The rejection of claims 1-24 in the last Office action is withdrawn in view of the applicants' amendment.

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

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7. Claims 1-3, 5-24 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. (US 10/557,339), in view of Fujii *et al.* (Pat. No. US 4,659,617). Although the preambles are different, and the conflicting claims are not identical; they are not patentably distinct from each other because the present claims indicated above also cover compositions which overlap with the claims of the copending applications above, and thus, render the present claims ***prima facie*** obvious. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the method for production of a metal oxide by Stark *et al.* (copending Application No. US 10/557,339), and the metal carboxylate prior to being formed into droplets which has a specific viscosity and the solvent is free of acid with a fibrous product of apatite as taught by Fujii *et al.* in order to find precursors for flame spray synthesis of oxide and metal nanoparticles that combine low viscosity and high metal concentration. Furthermore, such formulations should be readily produced and be stable upon storage. Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to arrive at the same inventive composition because the disclosure of the inventive subject matter appears within generic disclosure with the combination of the prior art as taught by Fujii *et al.* (Col. 4, lines 51-64).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

9. Claims 1-3, 9, 18-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Stark *et al.* (Pub. No. US 2004/0126298 A1). .

Regarding claims 1-3 and 20, Stark *et al.* disclose a method for the production of a metal oxide, wherein at least one metal oxide precursor is dissolved in a high enthalpy carboxylic acid solvent comprising at least one carboxylic acid with a mean carbon content of >2 carbon atoms in an amount of at least 60% of the whole solvent to form a solution (read on mixture, Page 2, ¶0015) and wherein said solution is then formed into droplets and flame oxidized (Page 2, ¶0035). The salt can also be produced within the solvent mixture *in situ*, meaning that a suitable salt precursor (namely a metal comprising compound, e.g. an oxide, a carbonate or a pure metal, that reacts with at least one of the components of the solvent to form a solution) is brought into the solvent mixture where it then forms the salt or derivative of the solvent (e. g. a carboxylic acid salt of a carboxylic acid from the solvent) (Pages 3 & 4,

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¶0044) wherein the carboxylic acid content is at least 75%, preferably at least 90%, more preferably about 100% (Page 3, ¶0039; Page 7, Claim 2). Stark *et al.* further disclose mixed oxides containing an element from the alkali metals and the transition metals, aluminates, borates, silicates (read on anion source, i.e. anionic group), phosphates (read on anion source, i.e. anionic group), hafnia, thoria, uranium oxide, etc. (Page 4, ¶0049).

Regarding claim 9, Stark *et al.* disclose a method for the production of a metal oxide, wherein the carboxylic acid is selected from C1 to C18 monocarboxylic acids and mixtures thereof (Page 3, ¶0040; Page 7, Claim 4).

Regarding claims 18, 19, Stark *et al.* disclose a method for the production of a metal oxide such as ceria and ceria/zirconia are mechanical and mechanical/thermal processes, wet-phase chemistry based methods, and high temperature methods such as flame spray pyrolysis (FSP) (Page 1, ¶0005), wherein the metal oxides, in particular mixed metal oxides (Page 4, ¶0052) have at least one very good particle size stability after heating (e.g. 700 °C., 16 hours in air, or 900 °C., 2 h, air) (Page 4, ¶0056).

Regarding claim 21, Stark *et al.* disclose a method for the production of a metal oxide, wherein the solvent has an enthalpy of at least 15 kJ/g, preferably at least 20 kJ/g, more preferably at least 23 kJ/g, e.g. at least about 23.7 kJ/g (Page 3, ¶0039; Page 7, Claim 7).

Since Stark *et al.* disclose the method for production of metal salts as the recited claimed, the method of the production of a metal oxide would inherently possess the recited limitation because same ingredients and condition are utilized. Stark *et al.* disclose all the

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limitations of the instant claims. Therefore claims 1-3, 9, 18-21 are as being anticipated by Stark *et al.*

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(c) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Applicant has provided evidence in this file showing that the invention was owned by, or subject to an obligation of assignment to, the same entity as Stark *et al.* (Pub. No. US 2006/0229197 A1) at the time this invention was made, or was subject to a joint research agreement at the time this invention was made. However, reference Stark *et al.* ("197") additionally qualifies as prior art under another subsection of 35 U.S.C. 102, and therefore, is not disqualified as prior art under 35 U.S.C. 103(c).

Applicant may overcome the applied art either by a showing under 37 CFR 1.132 that the invention disclosed therein was derived from the invention of this application, and is therefore, not the invention "by another," or by antedating the applied art under 37 CFR 1.131.

11. Claims 5-8, 10-13, 14 and 22 are rejected under 35 U.S.C. 103(c) as being unpatentable over Stark *et al.* (Pub. No. US 2004/0126298 A1) as applied to claim 1-3, 9, 18-21 above, and further in view of Stark *et al.* (Pub. No. US 2006/0229197 A1).

Regarding claims 5-8, Stark *et al.* ("298") discussed all the features as above. Stark *et al.* ("298") teach the method for the production of a metal oxide, wherein the carboxylic acid

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content is at least 75%, preferably at least 90%, more preferably about 100% (Page 3, ¶0039; Page 7, Claim 2). Stark *et al.* ("298") do not expressly teach the recited method for production of a metal oxide wherein the metal carboxylate prior to being formed into droplets has a viscosity of at most 100 mPas and the solvent is free of acid.

However, Stark *et al.* ("197") teach the method, preferably at most 40 mPas, wherein the enthalpy of the metal carboxylate at least 13 kJ/g and the oxidation is performed at a temperature of at least 600 °C (Page 3, ¶0038; Page 8, Claims 4, 12 14). Stark *et al.* ("197") also teach the viscosity is obtained by heating and/or by providing a mix of the at least one metal carboxylate (the anion source is disclosed in Stark *et al.* ("298")) and at least one viscosity reducing solvent (Page 8, Claim 5) wherein the solvent is free of acid (Page 8, Claims 7). The solvent comprises at least one low molecular weight and/or low viscosity apolar solvent selected from the group consisting of toluene, xylene, lower aliphatic hydrocarbons and mixtures thereof (Page 3, ¶0040; Page 8, Claim 8). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method for production of a metal oxide by Stark *et al.* ("298") so as to include the metal carboxylate prior to being formed into droplets which has a specific viscosity and the solvent is free of acid as taught by Stark *et al.* ("197") with reasonable expectation that this would result in avoiding any huge solvent costs, production of unwanted large amounts of waste water and need calcination steps after the synthesis, making them cost intensive and further provide increased homogeneity of the product as taught by Stark *et al.* ("197") (Page 1, ¶0005).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the method for production of a metal oxide by Stark *et al.* ("298") with the metal carboxylate prior to being formed into droplets which has a specific viscosity and the solvent is free of acid as taught by Stark *et al.* ("197") in order to avoid any

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huge solvent costs, production of unwanted large amounts of waste water and need calcination steps after the synthesis, making them cost intensive and further provide increased homogeneity of the product.

Regarding claims 10-14, Stark *et al.* ("298") disclose the metal oxide such as ceria/zirconia, with the zirconium being present in at most 90 atom%, preferably at most 80 atom% of total metal atoms. Stark *et al.* ("298") do not expressly teach the recited metal oxide is calcium and at least one further metal selected from the group consisting of magnesium, zinc, strontium, barium, rare earth metals, and mixtures of two or more of the above-mentioned metals.

However, Stark *et al.* ("197") teach the method, wherein the metal or the combination of metals is selected from the group consisting of any rare earth metal such as magnesium, calcium, strontium (Page 5, ¶0058, Page 8, Claim 10), wherein the metal carboxylate is prepared starting from a metal oxide, a metal hydroxide, a metal carbonate, a metal halide or a metal lower alkyl oxide (Page 8, Claim 13). Stark *et al.* ("197") also teach the metal carboxylates comprise impurities of one or more elements of the group comprising alkali metals, alkaline earth metals, transition metals, rare earth metals, chlorides, fluorides, bromides, phosphates, sulfates, silicon, and main group metals, whereby the impurities are present in amounts in the range of 0.5 to 5% by weight (read on 0.05 moles per liter, Page 8, Claim 15) and wherein the burner comprises nozzles and the solution comprises at least 0.15 moles metal per liter, leading to production rates of at least 0.15 moles metal or metal oxide per nozzle (Page 8, Claim 16). It is held that the substitution of equivalents (i.e. metal) requires no express motivation as long as the prior art such as Stark *et al.* ("197") recognizes the equivalency (Page 5, ¶0058, Page 8, Claim 10). In *re* Fount USPQ 532 (CCPA 1982); In *re*

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Siebentritt, 152 *USPQ* 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v Linde Air Products Co.*, 85 *USPQ* 328 (USSC). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method for production of a metal oxide by Stark *et al.* ("298") so as to include the metal combination (i.e. interchangeable metal) as taught by Stark *et al.* ("197") with reasonable expectation that this would result in avoiding any huge solvent costs, production of unwanted large amounts of waste water and need calcination steps after the synthesis, making them cost intensive and further provide increased homogeneity of the product as taught by Stark *et al.* ("197") (Page 1, ¶0005).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the method for production of a metal oxide by Stark *et al.* ("298") with the metal combination (i.e. interchangeable metal) as taught by Stark *et al.* ("197") in order to avoid any huge solvent costs, production of unwanted large amounts of waste water and need calcination steps after the synthesis, making them cost intensive and further provide increased homogeneity of the product.

12. Claims 15-17 and 23-24 are rejected under 35 U.S.C. 103(c) as being unpatentable over Stark *et al.* (Pub. No. US 2004/0126298 A1) and Stark *et al.* (Pub. No. US 2006/0229197 A1) as applied to claim 1-14, 18-21 above, and further in view of Fujii *et al.* (Pat. No. US 4,659,617).

Regarding claims 15-17, 23-24, Stark *et al.* ("298") and Stark *et al.* ("197") discussed all the features as above. Moreover, Stark *et al.* ("298") disclose a metal oxide that is obtainable by the recited method (Page 8, Claim 12), wherein a metal oxide has a dynamic oxygen storage capacity after heat treatment at 700 °C for 16 hours in air of at least 1.5 liters O₂ per kg catalyst (Page 8, Claim 18). Stark *et al.* ("298") do not expressly disclose wherein the metal salt

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is produced in a flame with insufficient oxygen for full combustion or conversion of the reactants resulting in the formation of substoichiometric salts and further wherein the metal salt is selected from the group consisting of amorphous tricalciumphosphate derivative, apatites and mixtures thereof.

However, Stark *et al.* ("197") teach the metal oxide is produced in a flame with insufficient oxygen for full conversion resulting in the formation of substoichiometric oxides or metals and mixtures thereof (Page 8, Claim 7), and further wherein the as-produced metal oxide is converted to the corresponding non oxides by means of an additional treatment (Page 8, Claim 17, Page 9, Claim 18). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method for production of a metal oxide by Stark *et al.* ("298") so as to include the metal salt is produced in a flame with insufficient oxygen for full combustion or conversion of the reactants resulting in the formation of substoichiometric salts as taught by Stark *et al.* ("197") with reasonable expectation that this would result in providing the nanoparticle manufacture from the pilot-scale production to an industrial scale synthesis (kg to ton quantities), and the most prominent is the choice of readily accessible metal precursors that allow sufficiently high production rates as taught by Stark *et al.* ("197") (Page 1, ¶0008).

Neither Stark *et al.* ("298") nor Stark *et al.* ("197") disclose wherein the metal salt is selected from the group consisting of amorphous tricalciumphosphate derivative, apatites and mixtures thereof. Fujii *et al.* disclose a fibrous product of apatite comprising one or more apatites selected from a group of apatites represented by the general formula: $M_{10} (ZO_4)_6 X_2$ wherein M represents Ca, Ba, Mg, Sr, Pb, Cd, Fe and the like, ZO_4 represents PO_4 , AsO_4 , VO_4 , CO_3 and the like, and X represents F, Cl, OH and the like (Col. 4, lines 51-64). At the time of

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the invention, it would have been obvious to a person of ordinary skill in the art to modify the method for production of a metal oxide by Stark *et al.* ("298"), and the metal carboxylate prior to being formed into droplets which has a specific viscosity and the solvent is free of acid by Stark *et al.* ("197") so as to include a fibrous product of apatite as taught by Fujii *et al.* with reasonable expectation that this would result in finding precursors for flame spray synthesis of oxide and metal nanoparticles that combine low viscosity and high metal concentration. Furthermore, such formulations should be readily produced and be stable upon storage as taught by Fujii *et al.* (Col. 3, lines 1-17).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the method for production of a metal oxide by Stark *et al.* ("298") and the metal carboxylate prior to being formed into droplets which has a specific viscosity and the solvent is free of acid by Stark *et al.* ("197") with a fibrous product of apatite as taught by Fujii *et al.* in order to find precursors for flame spray synthesis of oxide and metal nanoparticles that combine low viscosity and high metal concentration. Furthermore, such formulations should be readily produced and be stable upon storage.

Response to Arguments

13. Applicant's arguments with respect to claims 1-3, 5-24 have been considered but are moot in view of the new ground(s) of rejection.

In response to applicant's argument that stark *et al.* do not teach any anion source in its mixtures.

The examiner respectfully disagrees. Stark *et al.* ("298") disclose mixed oxides containing an element from the alkali metals and the transition metals, aluminates, borates,

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silicates (read on anion source, i.e. anionic group), phosphates (read on anion source, i.e. anionic group), hafnia, thoria, uranium oxide, etc. (Page 4, ¶0049). Furthermore, Stark *et al.* ("197") also teach the metal carboxylates comprise impurities of one or more elements of the group comprising alkali metals, alkaline earth metals, transition metals, rare earth metals, chlorides, fluorides, bromides, phosphates, sulfates, silicon, and main group metals, whereby the impurities are present in amounts in the range of 0.5 to 5% by weight (read on 0.05 moles per liter, Page 8, Claim 15) and wherein the burner comprises nozzles and the solution comprises at least 0.15 moles metal per liter, leading to production rates of at least 0.15 moles metal or metal oxide per nozzle (Page 8, Claim 16).

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Examiner Information

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bijan Ahvazi, Ph.D. whose telephone number is (571)270-3449. The examiner can normally be reached on M-F 8:0-5:0. (Off every other Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Y. Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BA/
Bijan Ahvazi,
Examiner
Art Unit 1796

/Ling-Siu Choi/
Primary Examiner, Art Unit 1796

12/10/2009